

**ABSTRACT**

The object is to provide a laser processing apparatus, a laser processing temperature measuring apparatus, a laser processing method, and a laser processing temperature measuring method which can highly accurately detect the processing temperature when carrying out processing such as welding with laser light. A laser processing apparatus 1A for processing members DR, UR to be processed by irradiating the members with laser light LB comprises a laser (semiconductor laser unit 20A) for generating the laser light LB; optical means for converging the laser light LB generated by the laser onto processing areas DA, UA; and a filter 30, disposed between the members DR, UR to be processed and the optical means, for blocking a wavelength of fluorescence generated by the optical means upon pumping with the laser light LB; wherein light having the wavelength blocked by the filter 30 is used for measuring a temperature of the processing areas DA, UA.